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(56) Documents cited
GB 1506187 A GB 0854866 A GB 0664996 A
GB 0345372 A GB 0235032 A

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(54) Construction elements

(57) Construction elements for use as a constructional toy has each element provided with a ball and socket. The balls are not perfectly spherical and the rims of the sockets are not perfectly round such that when the balls are aligned properly with the sockets the construction elements can be easily connected together and when the construction elements are twisted relative to one another the joint between them becomes stiffer and the construction elements become difficult to pull apart. Complex structures can be built by connecting together any combinations of such construction elements.

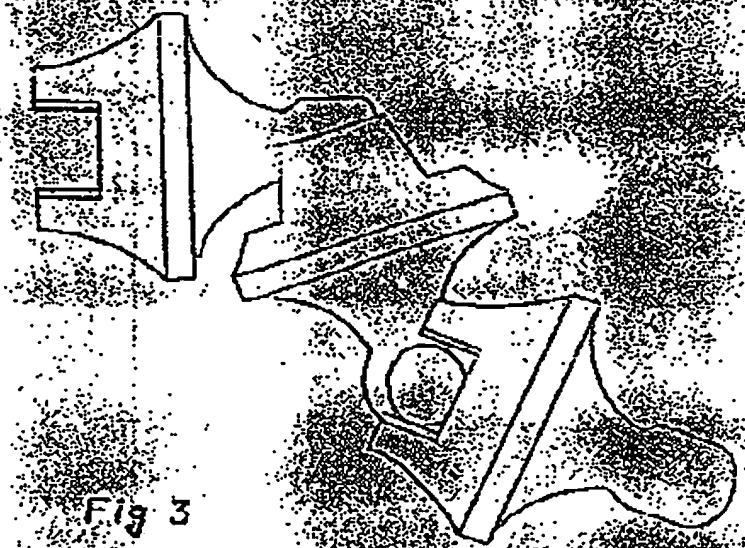

Fig 3

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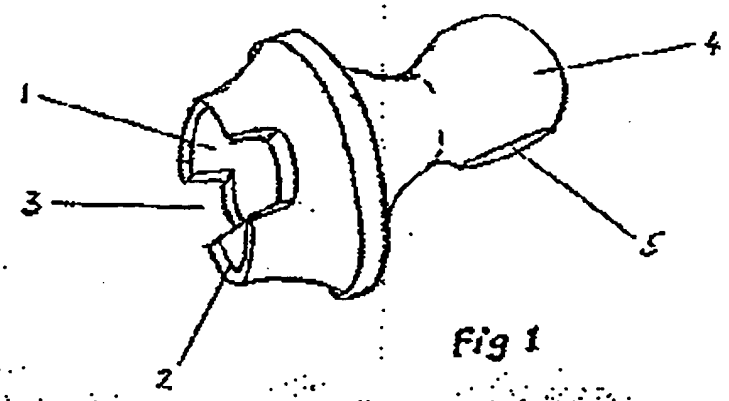


Fig 1

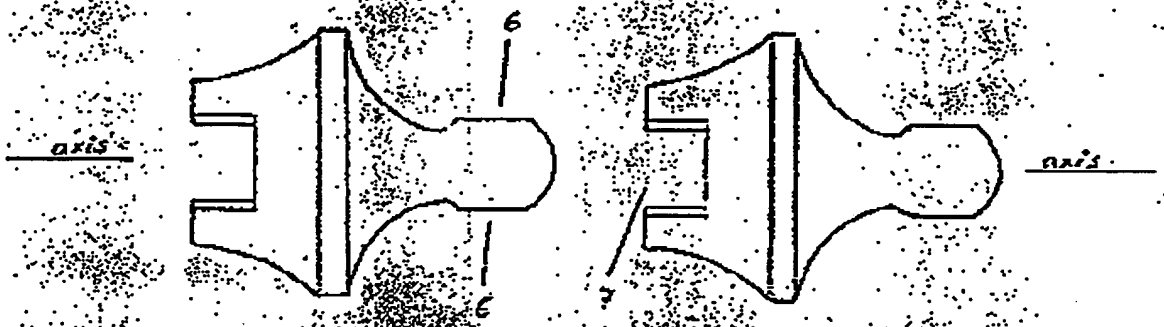


Fig 2

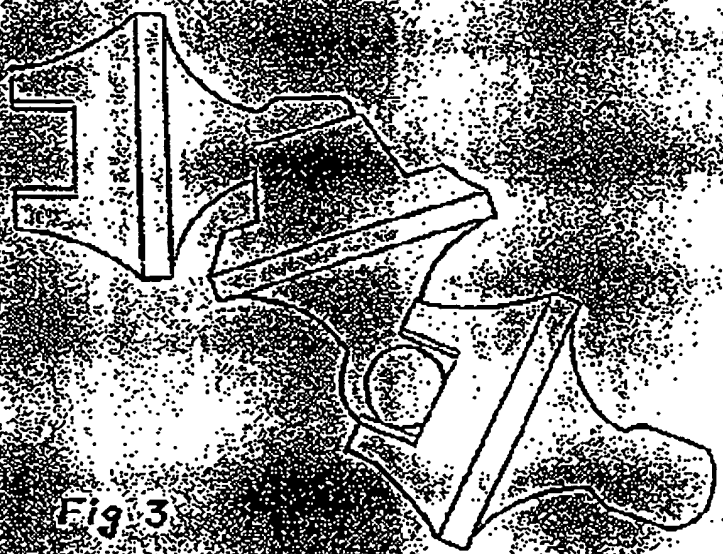


Fig 3

CONSTRUCTION ELEMENTS

This invention relates to construction elements and in particular the method of connecting the elements together and the degrees of freedom afforded by the elements when connected.

Construction elements are well known items consisting of a main body and connecting features. The main body can be any shape and size and the connecting features usually comprise a plug and a socket. Construction elements are connected together by inserting the plug of one element into the socket of another. In such manner a rigid structure can be built comprising any number of construction elements.

According to the present invention the construction elements are intended for use as a construction toy. Connection of the construction elements is achieved by using a ball type plug with a mating socket with a slight undercut to ensure that the ball is held tightly in place. The ball has a flat area on opposing sides such that the ball is not perfectly spherical and the socket has a slot cut in opposing sides. This same effect can be achieved using an oval ball and an oval socket rim. The ball and socket are connected to one another by offering the ball to the socket with the flat areas on the ball at ninety degrees to the slots on the socket. At this attitude the ball can be pushed into the socket with very little force. The ball can then be rotated relative to the socket by between approximately ten degrees and 170 degrees such that the non-flat areas of the ball engage with the non-slotted areas of the socket. At this attitude the undercut on the socket engages on the non-flat areas

of the ball producing a relatively stiff and strong joint between the ball and the socket and the connecting elements become difficult to pull apart. This method of connection also provides a high degree of freedom for movement between the construction elements. In practice the construction elements may have any number of ball and socket combinations such that complicated structures with branches can be made.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings.

Fig.1 shows in perspective a construction element. The socket (1) with undercut (2) and slots (3) and the ball (4) with flat area (5) can be clearly seen.

Fig.2 shows a side view of two construction elements prior to connection. The flats (6) of one ball can be seen correctly aligned to the slots (7) of one socket.

Fig.3 shows a side view of three construction elements when connected and rotated relative to each other.

In order to connect the construction elements they are aligned as illustrated in Fig.2 with the slots in the socket at ninety degrees (about the axis shown in Fig.2) to the flats on the ball. They are then pushed together with minimal force and one element is twisted (about the axis shown in Fig.2) by between ten degrees and 170 degrees relative to the other construction element. At this attitude the construction elements become firmly locked to

Once locked together, as described in the previous paragraph with the aid of Fig.2, the construction elements can be angled relative to each other by rotating the elements in any direction with the centre of the ball being the centre of rotation. Fig.3 illustrates one particular attitude attained in this manner. In practice there are an infinite number of positions, attainable by rotating one construction element relative to another using the centre of the ball as the centre of rotation.

CLAIMS

1. Construction elements comprising a ball and a socket, the elements being capable of being connected to one another by inserting the ball of one element into the socket of another.

2. Construction elements as claimed in Claim 1, wherein the ball of the construction element is not perfectly spherical, it being either oval in section or having flats on opposing sides.

3. Construction elements as claimed in Claim 1 or Claim 2, wherein the rim of the socket of the construction elements is not perfectly round, it being either oval or having slots on opposing sides.

4. Construction elements as claimed in Claim 1 or Claim 2 or Claim 3, wherein any number of such elements can be connected together by inserting the ball of one element into the socket of another element and twisting to form a strong joint with flexibility to rotate the construction elements in any direction about the centres of the balls.

5. Construction elements as claimed in Claim 4, wherein the elements may have any number of balls or sockets such that complicated branch structures can be manufactured.

6. Construction elements substantially as described herein with reference to figures 1 - 3 of the accompanying drawing.

Amendments to the claims have been filed as follows

1. Toy construction elements wherein each element has at least one ball and one socket, the balls and sockets of respective elements being arranged to cooperate such that in one relative orientation of two elements a ball can readily be inserted or removed from a socket to connect the elements, and when the ball is relatively rotated away from this orientation, a universal joint is formed between the elements whilst removal of the ball from the socket is restrained.

2. ... a kit of like toy construction elements as claimed in claim 1 which can be connected together to form an elongated flexible structure.

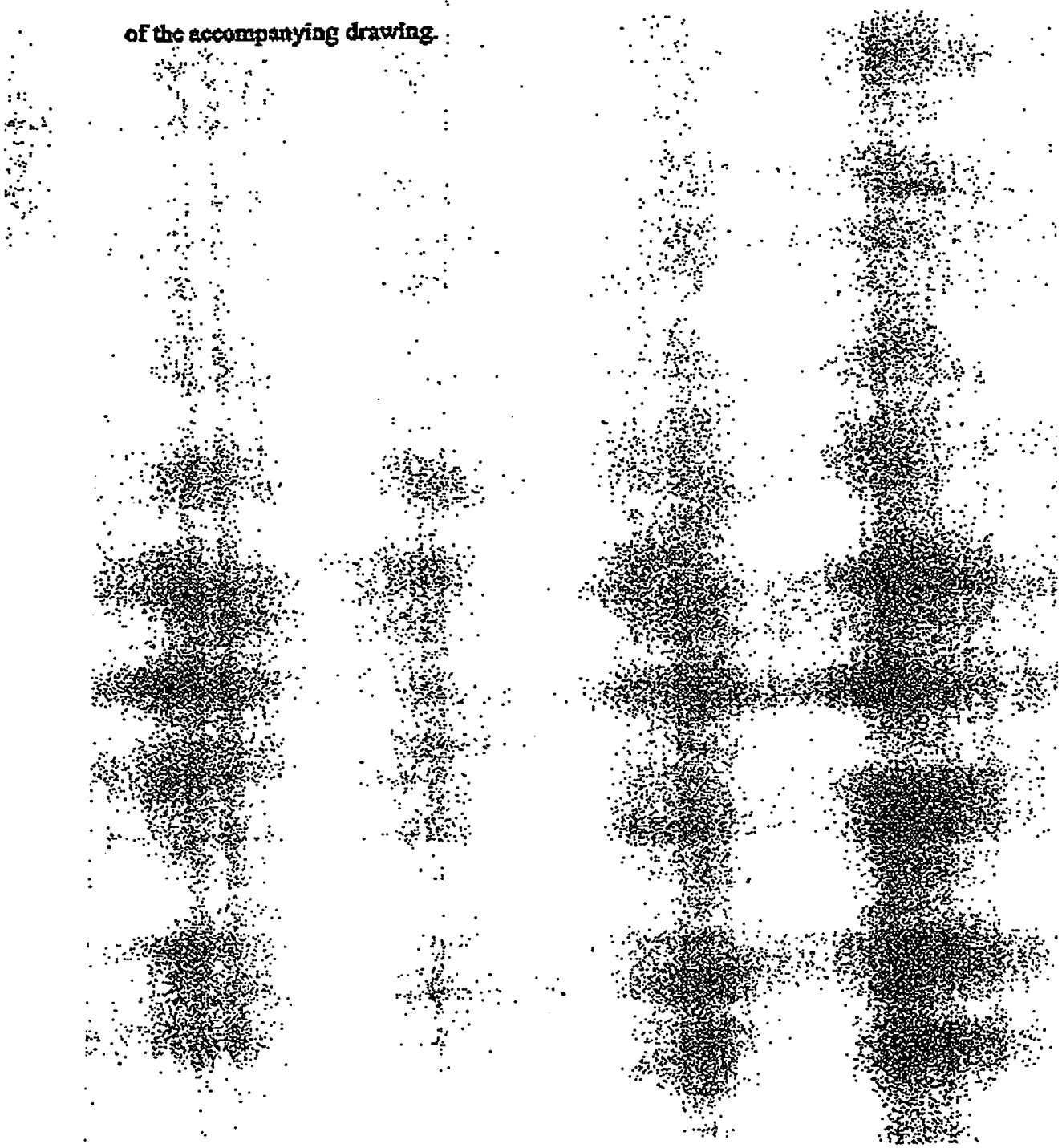
3. Construction elements as claimed in claim 1, wherein the ball of the construction element is not perfectly spherical, it being either oval in section or having flats on opposing sides.

4. Construction elements as claimed in claim 1 or claim 3, wherein the rim of the socket of the construction elements is not perfectly round, it being either oval or having slots on opposing sides.

5. Construction elements as claimed in claim 1 or claim 3 or claim 4, wherein any number of such elements can be connected together by inserting the ball of one element into the socket of another element and relatively rotating to form a strong universal joint.

6. Construction elements as claimed in claim 5, wherein the elements may have any number of balls or sockets such that complicated branch structures can be made.

7. Construction elements substantially as described herein with reference to figures 1-3 of the accompanying drawing.



Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

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Relevant Technical fields

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Search Examiner

A H MITCHELL

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

7 AUGUST 1992

Documents considered relevant following a search in respect of claims 1-6 AS ORIGINALLY FI

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 1506187 (HOLT) See Figure 1	1
X	GB 0854666 (CHELTON) See the head 10, Figure 1	1
A	GB 0664998 (BOREHAM)	1
A	GB 0345372 (BOREHAM)	1
X	GB 0345372 (MAIN) See Figure 7	1
X	GB 0235032 (HUCK) See Figure 4	1

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